An Passed March 10th 1828

Inaugural Dissertation
on a case of luxated
Hip-joint where the head of the bone
was lodged in the Thyroid foramen
Submitted for examination
To the medical Faculty
of the
University of Pennsylvania
For the Degree of
Doctor of medicine
by
Benjamin C Tomlinson
of
Pennsylvania
February
1828

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To John Phillips M. D. of Bristol, Pennsylvania.

My Dear Sir,

Feeling the weight of your kindness to me in giving me the rudiments of a medical education, and in directing my mind to the pursuit of science.

I would beg leave to dedicate to you this Essay as an humble testimony of that gratitude which I shall always feel happy in cherishing.

And that your valuable life may be protracted to an age replete with honour as it now is with admination, is the sincere prayer of

Your most obedient and

Ever Grateful pupil,

Benjamin C Tomlinson

Inaugural Essay &c

There is scarcely a disease, or accident in modern Surgery, that appears to have been treated less upon fixed and philosophical principles, than that form of luxation of the femur, in which the head of the bone is displaced downwards and forwards into the foramen thyroideum - The discordant and diversified forms of treatment that have been recommended and adopted, by Surgeons equally eminent in their profession, cannot fail to demonstrate conclusively the unsettled state of professional opinion on the subject -

These observations have been forcibly impressed upon my mind - by having lately witnessed an unsuccessful attempt at reduction of this species of luxation, by Gentlemen who can hardly be accused of want of skill or science in surgery.

After a very few observations I shall proceed directly to the history and treatment of this

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injury. The articulation which connects the trunk to the lower extremities, is one of the most interesting of our system, not merely from its anatomical structure, but also from the extent of its usefulness in performing all the offices of walking, leaping, running &c.—

It is formed by the union of the largest bones, the strongest ligaments, and most powerful muscles in the human body.

To enter into a minute detail of these parts would be superfluous and unnecessary, I shall therefore speak of them only as they are brought into action, or are acted upon in this form of luxation, which I conceive to be of the first importance that comes under the notice of the Surgeon, requiring his most patient and indefatigable exertions to replace. which, if not effected renders the unfortunate patient an entire cripple for a longer or shorter term of a miserable existance.

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This is the only form of Luxation of this joint which exposes the muscles to laceration, or in any essential degree puts them upon the stretch.

When the head of the bone is lodged in the thyroid foramen, not only the cotyloid ligament and capsule must suffer - but also a number of the small rotator muscles of the thigh must be torn by the powerful extension which they meet with, and in which the larger ones have to participate to no small degree.

In all the other forms of luxation of this joint the limb becomes shortened, and consequently the extent of muscular action is proportionally diminished.

The way this accident generally takes place is by a fall lighting upon the foot or knee, when the leg is thrown violently outwards, and somewhat backwards - The capsule is then torn through; the cotyloid ligament is lacerated - but the round

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ligament is not always broken, then giving way the trochanter major and the neck of the femoris comes in contact with the anterior inferior spinous process of the Ilium and the margin of the acetabulum, which acts as a fulcrum to throw the head of the bone downwards and forwards into the thyroid foramen, upon the obturator externus muscle. On these mechanical principles this accident is accounted for.

The signs which accompany this form of luxation are the following:- the limb is lengthened from two to three inches, the upper and internal part of the thigh is much thickened - and the hollow, which is generally felt between the extensor and flexor muscles is filled up, The head of the bone is not generally felt, whilst the upper and the outer part of the thigh where the great trochanter forms a prominence, is now occupied by a deep hollow - The foot maintains its natural

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position with the exception of its occasionally being turned slightly outwards, the knee is found partially bent, and the thigh is rather in a flexed condition, being separated from the one on the opposite side - The adductor muscles, from their points of insertion being elongated (as well as all the rest around the joint) form a tense cord, which is felt from the pubis, to below the middle of the thigh.

When any attempt is made at walking, there is a rotatory motion in the limb, as described by Dr Dorsey in his quotations from Boyer resembling the walking of a mower, in the foot he keeps forward, describing a semicircular motion outwards.

These symptoms as I have given them are as they occured in a case which recently came under the notice and care of my Preceptor Dr. Phillips of Bristol during the month of July last-

The case is as follows:-

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P. S... an elderly gentleman of Bristol, was walking on the margin of a kiln where he accidently stumbled — his left leg being violently abducted, received the whole weight of his falling body and was suddenly thrown out of place, Several unsuccessful attempts were made to rise — And he so remained until I arrived (my Preceptor being from home) when all the above described symptoms were upon him — No force that I could apply was sufficient to bring the affected limb in any measure towards the sound one. — On the arrival of the Doctor he was placed in the situation directed by Dr Dorsey for reducing luxated hip joint, and any means of reduction was made use of that he could employ with a double blocked pully, manned by six strong assistants. These, combined with large doses of Emetic Tartar, and copious blood-letting were wholly incompetent to remove the

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head of the Bone in any perceptible measure from its unnatural situation.

As the night had far advanced, it was in the evening the accident occurred, he was abandoned until morning, when he was conveyed to the Penn^a Hospital where, under the hands of Drs. Parrish - Barton and others, was again subjected to the same mode of operation, which was attended with the same unhappy result. Finding this ineffectual, that directed by Cooper & Travers was applied with great power, and a rotatory motion kept up for a considerable time but proved equally unsuccessful - The patient was accordingly pronounced incurable.

The circumstances of this case, led me to consider more minutely the anatomy of the parts, that I might be satisfied of the reason why these different operations were unsuccessfully performed.

And as regards the first, I shall endeavour to present the following reasons.

But before I enter upon the causes why the bone was not replaced I shall state the treatment of such accidents as directed by the late Professor Dorsey in his Elements of Surgery. He says the patient should be laid on his back upon a table covered with a mattress or folded blankets. Extension and counter-extension should be made by securing the patient with a band passed between the pudendum and luxated thigh fastened to a post or staple in the wall, or given into the hands of a sufficient number of assistants. thus counter-extension is made, whilst extension is performed by securing a folded sheet or strong band above the knee by means of a roller passed tightly around the limb at this place. To this, pullies are to be applied, or a sufficient number of assistants to draw the head of the bone from its unnatural situation. Should not this prove successful,

he is to pass a band under the thigh and around the shoulders of the operator, who puts his knee on the crista of the ilium and raises the head of the bone to the margin of the acetabulum over which it must pass in order to gain its natural situation.

Thus this formidable joint is replaced and its unparalleled strength overcome by the exertions of a single man. For I conceive it to be inconsistent with the anatomy of the parts for any direct extension to be of the least advantage in this form of dislocation. Not, but that I think it necessary, to make use of some, yet when it is made it should not be as Dr Dorsey has directed, but in such a manner as shall be explained hereafter.

When the origin and insertion of those muscles which surround the hip joint are considered, it must be evident from the situation

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of the head of the bone and the lengthened condition of the limb. that they are much upon the stretch, and this unnatural condition can only prove a stimulus to increase their natural contractility.

Should we aggravate this kind of action by giving fresh impulse to their efforts? By no means, this would be worse than useless – yet it is said, that it not only should be done but should be continued until the strength of the muscles are entirely overcome, and their original power exhausted.

How far any advantage is to be gained by this mode of operating, I am at a loss to determine, from these several reasons 1st, by its being in a direction from the acetabulum 2d, by the contraction of the muscular fibre and lastly, because it is upon their contraction we have in some measure to depend for

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the restoration of the limb — These ideas I am conscious are contrary to some of the most learned of the surgical profession, but, as I conceive them to be founded upon anatomical principles, I feel but little hesitancy in advancing them — After having said this much, I think the conclusion evident, that no extension can be of the least possible advantage, if made in a line with the body, but will only increase the difficulty of the operation, and augment the pain of the unfortunate sufferer.

This brings me to consider the plan directed in Cooper & Travers' Surgical Essays. part first. After describing the accident, the signs which accompany it, and the appearance on dissection, they go on to state the mode of operating, which is as follows:

"The reduction of this dislocation is generally

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very easily effected, If the accident has happened recently all that is required is to place the patient upon his back, separate the thighs as widely as possible, and to place a girt between the pudendum and upper part of the thigh, fix it to a staple in the wall,
The surgeon then puts his hand upon the ankle of the dislocated side and draws it over the sound leg, and it slips into its socket — thus I saw a dislocation reduced —
" But in general it is required to fix the pelvis with a girt crossed under that which passes round the thigh, otherwise the pelvis moves in the same direction with the head of the bone — And in those cases where the dislocation has existed for three or four weeks it is best to place the patient upon his side to fix the pelvis by one band and carry another under the thigh to which the pullies are

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affixed, then to draw the thigh upwards whilst the surgeon presses down the foot to prevent the lower part of the limb from being drawn with the thigh bone. thus the limb is used as a lever of very considerable power.

Great care (he goes on to say) must be taken not to advance the leg in any considerable degree otherwise the head of the thigh bone will be forced behind the acetabulum into the ischiatic notch. from whence it cannot often be reduced.

To this mode of operating there cannot be the same kind of objection. but though it is more consistent with the mechanism of this joint, yet it does not present itself with that lucidity which should accompany a subject of so much importance.

My object in being so minute in giving the manner in which this operation is directed, is not for the sake of disputing its utility - but to inquire

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into the reason why it proved ineffectual to restore the luxation I have above related. I shall therefore state my views in as concise a manner as possible.

And with respect to the extension and counter extension, this may prove successful as Mr Cooper says in some instances, but in those cases where it does so, it is because the laceration of the cotyloid ligament is such, as to permit the head of the bone to slip through the aperture with but little effort - for if it be the upper part which is torn, the extension will have to be sufficient to raise the head of the bone to its summit or on a level with the margin of the acetabulum. to effect this without tearing the obturator pyriformis gemini & quadratus muscles is next to impossible - but admitting they become so relaxed by fatigue or deprived of their strength by other means, it will avail

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but little for the moment the force is removed that moment it will resume its former situation, there being no impulse to direct it towards its articulating cavity;— but I suppose it is on the contraction of the Abductors we have to depend to perform this office, then if the abductors will act so also will the adductors. and I contend their action will be principally that of counteracting the extending force.

I shall now proceed to consider as the last mode of operating, that performed by William Hey.

As I have employed the language of the different authors whose names are inserted in this Essay. I shall conceive my thesis much honoured by a transcript from the writings of this truly practical man.

"In this species of dislocation, as the head of the bone is situated lower than the acetabulum, it is evident that an extension made in a right line with the trunk of the body, must remove the head of the

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bone further from its proper place, and thereby prevent, instead of assisting, reduction. The extension ought to be made with the thigh at a right angle or inclining somewhat less than a right angle, to the trunk of the body. When the extension has removed the head of the bone from the external obturator muscle, which covers the great foramen of the os innominatum, the upper part of the os femoris must then be pushed or drawn outwards, which motion will be greatly assisted by moving the lower part of the os femoris at the same moment in a contrary direction, and by a rotatory motion of the bone upon its own axis turning the head of the bone towards the acetabulum"

As regards this mode of operation, it will be seen at once to meet with a corroborative reception for though it is said the limb should not be advanced in any considerable degree or the head

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of the bone will be forced behind the acetabulum into the ischiatic notch. Yet, from what I have been taught of the nature of muscles, and their action, and more particularly, from what I have learned by my own observation of this part of the human subject, that, for such an accident to take place, would require almost a physical impossibility. Because the moment we view the situation and attachment of the obturator, the quadratus, and in fact, all the muscles surrounding the articulation, we must be convinced of the truth of this remark - Also the laceration of the capsular ligament, necessarily being in the direction the head of the bone takes, and the round ligament according to Dr Dorsey, not being broken must exercise considerable influence in preventing such an occurrence ever taking place. And I am very doubtful whether the gentlemen who gives this advice, has a practical acquaintance with it

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for such is the rareness of the accident that scarcely one practitioner in twenty ever witnesses it, so much is this the case, that in the practice of Mr. Hey who for upwards of thirty years was connected with one of the largest infirmaries in England never saw but three cases, all of which were successfully treated upon these proscribed principles.

And in the case I have related though the leg was flexed and extended, or in other words advanced and retracted, the head of the bone still retains its unnatural position. in respect to this mode of operating it will be sufficient to say. the force of four strong men aided by powerful pullies was wholly insufficient to effect a reduction.

To proceed with Mr Hey's operation. I shall go on to state my reasons why I think it better calculated than the others to restore the limb to its natural situation.

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muscles. Every one who has dissected these parts or carefully read over their description, is aware that those muscles which about the thigh perform their office by drawing inwards and obliquely upwards, which when put upon the stretch as they are in this form of luxation must necessarily draw the head of the bone firmly upon its resting place. That they have this kind of action is demonstrated by the leg being thrown out from its fellow. And as I have stated in my description of the case, no force that I could apply was sufficient to overcome their resistance.

The adductors also though differently situated and perform a directly different office, yet the manner in which they do it is precisely the same viz:- inwards and upwards, consequently they must assist in keeping the head of the bone in its unnatural position. Our object now is to overcome the resisting or retaining force, which is to be effected. not by

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bleeding, nor by nauseating doses of emetic tartar nor by any other means that can be made use of to relax the muscles, whilst this kind of extension is applied, for should they be as relaxed as they are in the dead subject and the power applied, sufficient to tear the limb from the body, it would only prevent (as Mr Hey says) instead of assisting reduction. Should lateral extension be resorted to? this has already been answered in the negative. How then shall we proceed, as neither direct nor lateral extension are of any service? My answer is in the first place flex the leg to less than a right angle with the body by which the points of muscular insertion are brought nearer together consequently the power which was the principal obstacle is at once overcome in a great degree. The muscles thus being relaxed the head of the bone can with less difficulty be removed from its unnatural situation

Secondly - whilst the leg is flexed (for I see no reason why it should not) make use of a well directed extension forwards and upwards, this will relieve the obturator muscle from the pressure of the head of the bone, and draw it almost directly towards the acetabulum which is the direction most required.

Thirdly and lastly - whilst these proceedings are going on, by a rotatory motion direct the head of the bone towards its articulating cavity, and with the assistance of slight pressure upon the internal and upper part of the thigh, or with a band applied to the part and put into the hands of an assistant with directions to draw upwards and outwards, all resistance is at once overcome and the bone is heard to resume its wonted location with an audible snap.

The question now presents itself, how shall the patient be placed that this operation may be performed?- I would answer in the following manner:- first lay him on a table covered by a matteas or folded blankets, upon his sound side, then pass a band around the innominata of the affected side, so as to go below the anterior superior spinous process of the ilium- across the pubis and under the tuberosity of the ischium to be united with the other end of the band, which is secured to a post, or staple in the wall- this will effect a complete counter-extending influence, not permitting the body to be drawn in any direction by the extending bands and pulleys- which are to be applied as in ordinary cases, differing only in the direction in which they perform their office- an assistant being behind the patient to support his back- and another should be stationed upon the table, with a

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towel or strap sufficiently strong to draw the thigh as above directed. thus all will be in rea=dineſs to effect the reduction.

Thus I have endeavoured to give a definite statement of the nature of the accident; the signs which accompanied it and the different operations performed for its restoration, with a few reflections on each as they have been directed by the Gentlemen whose names are above recorded. As it regards the two first, I am induced to believe they have never proved successful un=leſs it has been by the same means the luxation took place viz. accidentally. The first is incons=istent with mechanical principles and totally devoid of every thing that might be considered philosophical.

The second presents insurmountable difficulties and without as has been remarked by a celebrated Surgeon and Anatomist the

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margin of the acetabulum is torn off by the cotyloid ligament. so as to form a plane surface for the head of the bone to slip over, is of but little use.

The last and most plausible, that performed by Mr Hey is the only one of the three, which pre=sents any justifiable grounds for its employment.

I have given it at full length, only modifying in a slight degree the situation of the patient for the application of the extending and counter==extending bands:-

I would now remark, if my views of this subject, have not met those of the above mentioned surgeons. It must be imputed to the superiority of their knowledge, for I have no authority but my own observations in making the assertions contained in this essay.-